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ABSTRACT

Semantically congruous and incongruous sentences that varied in their syntactic complexity served as the contextual material in a study investigating the use of contextual cues in ongoing word recognition. The dependent variable was the time necessary to name target words that were preceded by the various context conditions. Subjects were 24 eighth grade students, fourth grade students, and adults, half of whom were skilled, half unskilled readers. Results revealed that the overall semantic context effects were greatest for the fourth grade subjects, less so for those in eighth grade, and smallest for the adults. In addition, less skilled readers showed larger overall semantic context effects than did skilled readers. There was a trend, however, for the less skilled readers to show greater overall semantic context effects in the simple syntactic condition than in either the complex syntactic condition or the neutral syntactic condition. The fourth grade skilled readers showed a trend in the opposite direction, with greater overall semantic context effects in the complex syntactic condition. (HOD)

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Ruth G. Nathan

The Effects of Semantic and Syntactic Context On Ongoing Word Recognition: A Test of the Interactive-Compensatory Model

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Statement of the Problem

This study concerns the role of contextual cues on ongoing word recognition. While it is clear that word recognition is sensitive to many variables (Henderson, 1982), which sources of information influence word recognition at various developmental and skill levels is unclear. The present study investigated the use of context as one potential information source.

There is major theoretical and empirical disagreement over how and when context is used to facilitate, or speed, word recognition. Some reading theorists postulate that older and skilled readers use context more than younger and less-skilled readers to hasten word recognition (e.g., Goodman, 1976; Smith, 1971,1978), while other theorists suggest that better readers tend to adhere more to the visual aspects of the text, using contextual information more for comprehension purposes than for recognizing words (e.g., Juel, 1980; Perfetti and Roth, 1981; Stanovich, 1980).

This latter suggestion, that better readers are less dependent on context to recognize words than poor readers are, has been incorporated into an interactive-compensatory model of reading (Stanovich,1980). This model assumes that while word recognition is based on simultaneous accumulation of information from both visual and non-visual sources, a deficit in any one information source can result in greater reliance upon other more readily available sources.

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Younger or less-skilled readers are characterized as less efficient in the visual analysis of words than older or skilled readers, and thus are assumed to make greater use of semantic and syntactic context to aid word recognition. As yet, only a limited number of the predictions resulting from such a view have been tested (e.g., Freebody and Anderson, 1983; Schwantes, 1981; Perfetti and Roth, 1981; Stanovich, West, and Feeman, 1981; Underwood and Barge, 1982).

Some empirical evidence regarding the use of semantic context has given the compensatory assumption some backing (Schvaneveldt, Ackerman and Semlar, 1977; Stanovich and West, 1978; Stanovich, West and Feeman, 1981;Schwantes, 1981; Underwood and Barge, 1982). All of these studies found that younger and/or poorer readers benefited at least as much from semantic context in word recognition as did older and better readers.

While a few studies have been designed to test semantic aspects of the interactive-compensatory model, none have been designed specifically to test the effect of syntax on compensatory processing. The present study explored how syntactic structure might interact with compensatory processing by assessing the time it took to name a target word which was preceded by either a simpler (compound), complex, or scrambled (neutral) syntactic structure which was half the time congruous with the target word and half the time incongruous. Also, since most studies that have tested the compensatory assumption have used simple, single clause sentence primes, it was of general interest to know if larger context effects associated with younger or less-skilled subjects would be found with syntactically more complex sentence primes, as well as with simple, single clause primes.

The question of the effect of syntactic complexity on word

recognition is more than academic. There is some suggestion in the literature that syntactic complexity may pose problems for less-skilled readers (e.g., Byrne, 1981; Leu, 1982; Smith, 1978; Vellintino, 1977). If syntactic complexity affects word recognition to the point where it uses some of a reader's available attention, then less attention would be left for predicting upcoming text. For those that use prediction to facilitate their word recognition, greater syntactic complexity should slow ongoing word recognition.

Subjects

Twenty-four fourth grade, eighth grade, and adult subjects were tested. At each grade level, half were skilled readers and half were less-skilled. The criteria for placement in proficiency groups was reading achievement test performance.

Method

Semantically congruous and incongruous sentences which varied in their syntactic complexity (simple, complex, and neutral) served as the contextual material. The dependent variable was the time to name target words which were preceded by the various context conditions.

Syntactic complexity was operationalized by using the DiStefano-Valencia (1980) weighting scale which takes into account the number and type of transformations used in a sentence as well as the depth of modification. Target words were obtained by collecting cloze data on the sentence contexts from a separate group of children and adults. Target words were balanced in terms of their predictability for children and adults.

Results

The results from a four-way anova on the reaction time measure indicated that the main effects of grade, skill, and semantic context were all significant at the .001 level, while the main effect of syntactic complexity was significant at the .02 level. The first interaction relevant to the study, semantic context x grade level, was statistically significant ($F(2,66)= 4.78$, $p < .01$): overall semantic context effects were largest for the fourth graders, less so for the eighth graders, and smallest for the adults. The semantic context x skill interaction was also significant ($F(1,66)= 5.04$, $p < .05$): less-skilled readers showed larger overall semantic context effects than skilled readers. The three-way interactions important to this study, grade x semantic congruity x syntactic complexity and skill x semantic congruity x syntactic complexity, were not significant. There was a trend, however, for the less-skilled readers to show larger overall semantic context effects in the simple syntactic condition than in either the complex syntactic condition or neutral syntactic condition. The fourth grade skilled readers showed a trend in the opposite direction, with larger overall semantic context effects in the complex syntactic condition. A four-way analysis on the error rates revealed that the results of the reaction time analysis were not obscured by a speed-accuracy tradeoff.

Conclusions

The previous developmental finding of greater semantic context effects associated with younger readers was replicated with primes that were not simple, single clauses. The two-way interaction between semantic congruity and grade level was significant, with the fourth

graders showing larger congruity effects than the adults. Proportional data (the overall context effect divided by the average response time in the incongruous neutral condition) did not reverse this pattern. This developmental finding, that younger children's naming times were more affected by context than were older children's naming times, adds empirical evidence to the growing body of data which suggests that the time to name a target word is reduced by related semantic context, and that this reduction is further dependent upon a person's age. The previous finding of greater semantic context effects associated with less-skilled readers (e.g., Perfetti, Goldman, and Hogaboam, 1979; Simpson, Lorsbach and Whitehouse, 1983) was also replicated. Theories which posit a larger role for sentence context in ongoing word recognition for older or skilled readers (Goodman, 1976; Smith, 1971,1978) cannot account for the present results. In this study, younger and less-skilled readers employed sentence context to aid their word recognition as much or more than older readers did.

Since there was not a three-way interaction between semantic congruity, syntactic complexity, and age, or semantic congruity, syntactic complexity, and skill, one must conclude that syntactic complexity, as manipulated in this study, does not differentially affect semantic processing at the age or skill levels tested. Trends in the data showing larger syntactic effects in the simpler syntactic condition for the less-skilled, and especially the younger, less-skilled population, warrant further investigation however.

Figure 1. Examples of contextual conditions

Condition	Context	Target
congruous	the soldiers flew in the	plane
neutral	they say it was the	plane
incongruous	the cowboy fired the	plane

TABLE 1

EXAMPLES OF SENTENCE-TARGET PAIRS

CONGRUOUS	
Simple:	Simple:
The unhappy hunters were tired, so they hauled away the animal cage.	Julie remembered the fruit, so she quickly snatched a juicy apple.
Complex:	Complex:
The unhappy hunters, tired, hauled away the animal cage.	Julie, remembering the fruit, quickly snatched a juicy apple.
Neutral-1:	Neutral-1
Tired the hunters away happy the hauled animal cage.	The a remembering fruit snatched quickly Julie juicy apple.
INCONGRUOUS	
Simple:	Simple:
Julie remembered the fruit, so she quickly snatched a juicy cage.	The unhappy hunters were tired, so they hauled away the animal apple.
Complex:	Complex:
Julie, remembering the fruit, quickly snatched a juicy cage.	The unhappy hunters, tired, hauled away the animal apple.
Neutral-2:	Neutral-2:
The a remembering fruit snatched quickly Julie juicy cage.	Tired the hunters away happy the hauled animal apple.

TABLE 2

MEAN REACTION TIME AS A FUNCTION OF SEMANTIC CONTEXT SYNTACTIC CONTEXT, GRADE AND SKILL

	GRADE LEVEL					
	Fourth		Eighth		Adult	
	Less Skilled	Skilled	Less-Skilled	Skilled	Less-Skilled	Skilled
CONGRUOUS						
Simple	558(.01)	524(.01)	505(.02)	414(.02)	423(.03)	394(.01)
Complex	544(.01)	513(.01)	490(.01)	423(.00)	422(.01)	396(.00)
Neutral	581(.06)	575(.03)	521(.06)	436(.02)	441(.05)	417(.03)
INCONGRUOUS						
Simple	655(.10)	575(.04)	591(.07)	456(.05)	474(.06)	423(.04)
Complex	617(.06)	599(.06)	561(.08)	443(.10)	448(.09)	428(.04)
Neutral	619(.08)	597(.04)	556(.08)	464(.06)	460(.04)	420(.02)
FACILITATION						
Simple	61(.07)	73(.02)	51(.06)	50(.03)	37(.01)	26(.01)
Complex	75(.06)	84(.02)	66(.07)	41(.06)	38(.03)	24(.02)
INHIBITION						
Simple	36(.02)	-22(.00)	35(.01)	-8(.01)	14(.01)	3(.02)
Complex	-2(-.01)	2(.03)	5(.01)	-21(.08)	-12(.04)	8(.01)
OVERALL CONTEXT EFFECTS						
Simple	97(.09)	51(.02)	86(.05)	42(.03)	51(.02)	29(.04)
Complex	73(.05)	86(.05)	71(.06)	20(.09)	26(.08)	32(.04)
Neutral	38(.00)	22(.01)	35(.02)	28(.03)	19(.07)	3(.01)

NOTE: Mean percentage of errors is indicated in parentheses.

TABLE 3

FOUR-WAY ANALYSIS OF VARIANCE ON MEAN REACTION TIME

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F	TAIL PROBABILITY
Grade	1665278.16667	2	832639.08333	29.65	0.000
Skill	315306.11343	1	315306.11343	11.23	0.001
Grade x Skill	105647.01852	2	52823.50926	1.88	0.160
ERROR	1853448.51389	66	28082.55324		
Context	218835.02083	1	218835.02083	98.27	0.000
Context x Grade	21293.72222	2	10646.86111	4.78	0.011
Context x Skill	11234.28009	1	11234.28009	5.04	0.028
Context x Grade x Skill	2556.90741	2	1278.45370	0.57	0.566
ERROR	146976.23611	66	2226.91267		
Word Syntactic Complexity	21179.76389	2	10589.88194	4.11	0.018
Syntactic Complexity x Grade	3211.94444	4	802.98611	0.31	0.869
Syntactic Complexity x Skill	14039.5879[illegible]	2	7019.79398	2.73	0.069
Syntactic Complexity x Grade x Skill	3883.09259	4	970.77315	0.38	0.824
ERROR	339927.27778	132	2575.20665		
Context x Syntactic Complexity	24758.04167		12379.02083	7.85	0.000
Context x Syntactic Complexity x Grade	5080.77778	4	1270.19444	0.81	0.524
Context x Syntactic Complexity x Skill	3954.58796	2	1977.29398	1.25	0.288
Context x Syntactic Complexity x Grade x Skill	5849.37037	4	1462.34259	0.93	0.450
ERROR	208251.55556	132	1577.66330		

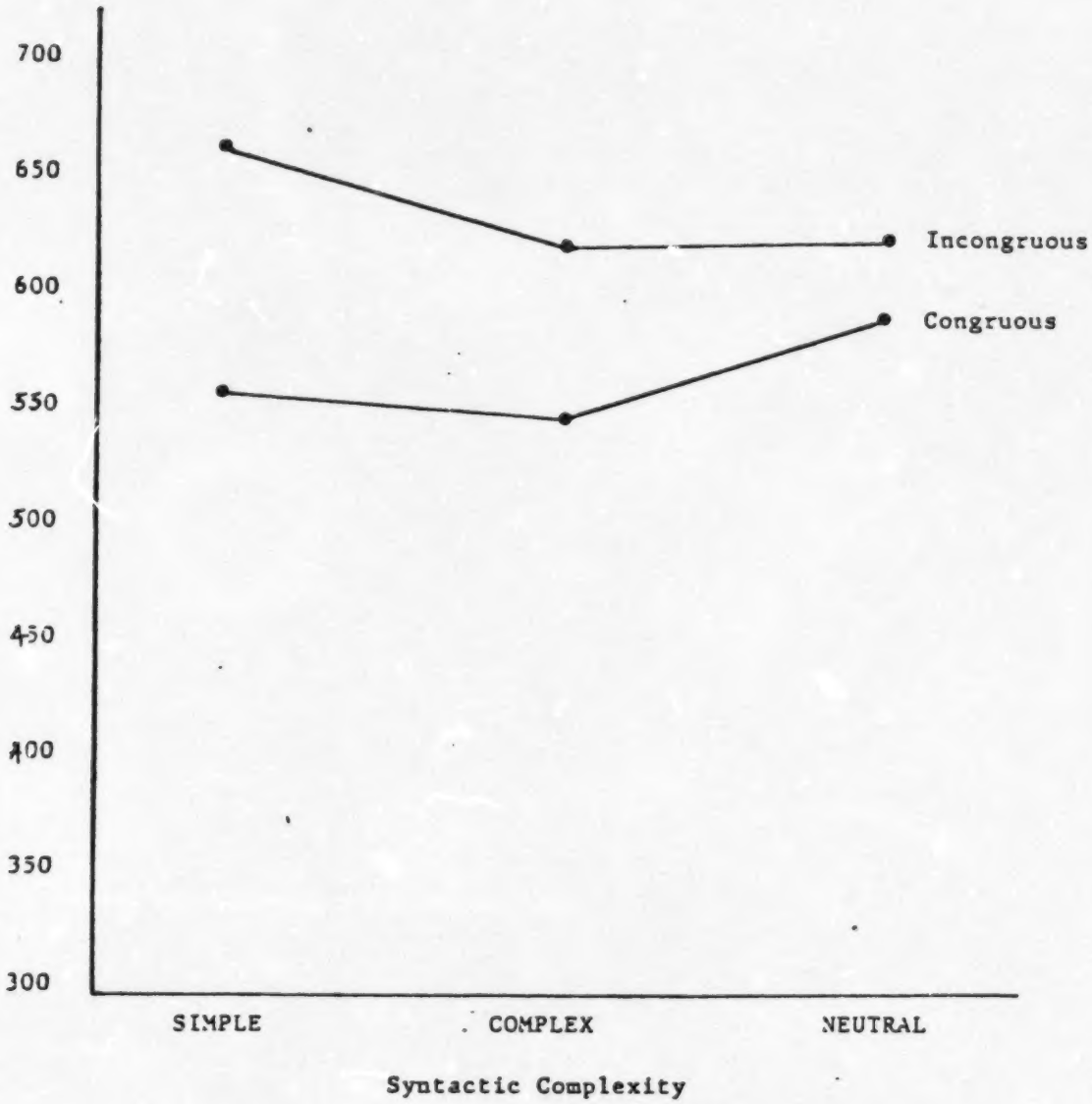

Figure 1: Context by Syntactic Complexity Interactions With Less-Skilled, Fourth Grade Children

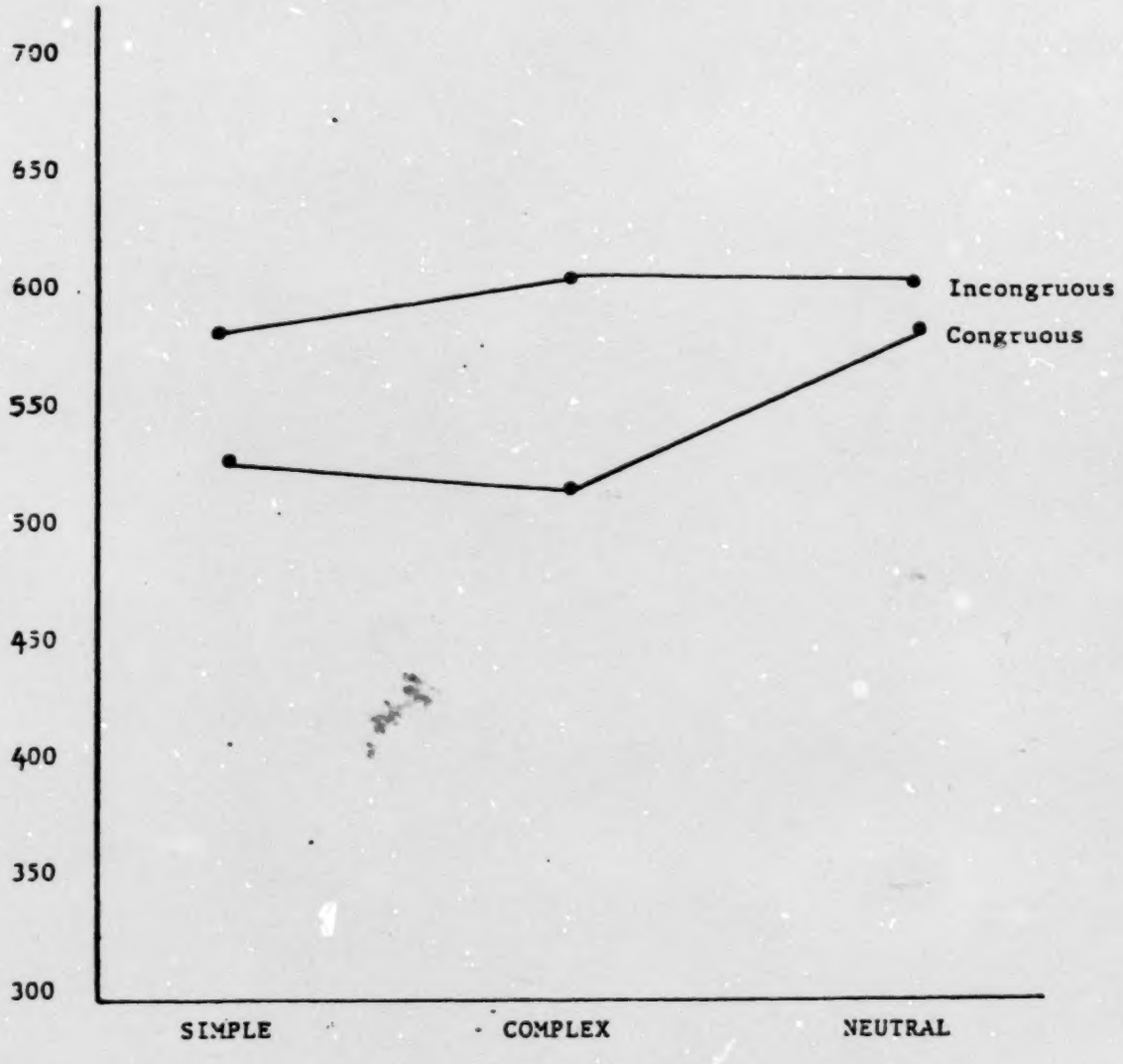

Figure 2: Context by Syntactic Complexity Interactions With Skilled, Fourth Grade Children

REFERENCES

Byrne, B. (1981) Deficient syntatic control in poor readers: Is a weak phonemic memory code responsible? Applied Psycholinguistics, 2, 201-212.

DiStefano, P., & Valencia, S. (1980) The effects of syntatic maturity on comprehension of graded reading passages. Journal of Educational Research, 75, 249-251.

Feebody, P., & Anderson, R. C. (1983) Effects of vocabulary difficulty, text cohesion, and schema availability on reading comprehension. Reading Research Quarterly, 18, 277-294.

Goodman, K. S. (1976) Reading: A psycholinguistic guessing game. In H. Singer & R. Ruddell (eds.), Theoretical models and processes of reading. Second edition, Newark, Del.: International Reading Association.

Henderson, L. (1982) Orthography and word recognition in reading. New York: London Press.

Juel, C. (1980) Comparison of word identification strategies with varying context, word type, and reader skill. Reading Research Quarterly, 16, 358-376.

Leu, Jr., D. J. (1982) Differences between oral and written discourse and the acquisition of reading proficiency. Journal of Reading Behavior, 14, 111-125.

Perfetti, C. A., Goldman, S. R., & Hogaboam, T. W. (1979) Reading skill and the identification of words in discourse context. Memory and Cognition, 7, 273-282.

Perfetti, C. A., & Roth, S. (1981) Some of the interactive processes in reading and their role in reading skill. In A. M. Lesgold and C. A. Perfetti (eds.), Interactive Processes in Reading. Hillsdale: Lawrence Erlbaum.

Schwantes, F. M. (1981) Locus of the context effect in children's word recognition. Child Development, 52, 895-903.

Simpson, G. B., Lorsbach, T. C., Whitehouse, D. (1983) Encoding and contextual components of word recognition in good and poor readers. Journal of Experimental Child Psychology, 35, 161-171.

Smith, F. (1971, 1978) Understanding reading. New York: Holt, Rinehart and Winston.

Stanovich, K. E. (1980) Toward an interactive-compensatory model of individual differences in the development of reading fluency. Reading Research Quarterly, 16, 32-71.

Stanovich, K. E., West, R. F., & Feeman, D. J. (1981) A longitudinal study of sentence context effects in second-grade children: Tests of an interactive-compensatory model. Journal of Experimental Child Psychology, 32, 185-199.

Underwood, G., & Barge, K. W. (1982) Word shape, orthographic regularity and contextual interaction in a reading task. Cognition, 12, 197-209.

Vellutino, F. R. (1977) Alternative conceptualizations of dyslexia: Evidence in support of a verbal deficit hypothesis. Harvard Educational Review, 47, 334-335.